The Riparian Forest: A Commitment to Stewardship

By ***Bob Keefe***, Retired Forester, Cullman

(Editor's Note: Part One of a Two-Part Story)

The term "riparian forest" is not one that normally finds its way into the daily vocabulary of the average person in Alabama's forestry community. Whenever we think of a "riparian" forest, or as Webster would define it, a forest "relating to or living or located on the bank of a natural watercourse," we usually think of a streamside management zone or "SMZ." But these terms are not exactly synonymous. A riparian forest is much more than an SMZ, and understanding the difference can be a first step in developing a higher commitment to good stewardship, and thus sustainable forestry, on Alabama's forestlands.

Under the typical even-aged silvicultural system of forest management practiced in Alabama, our real opportunity to promote management activities that feature non-timber related values lies in the riparian areas. These areas are ideal for protecting and restoring plant and animal biodiversity, for incorporating aesthetic management principles, for providing recreational opportunities and, of course, for protecting water quality.

Riparian Forests and SMZs

The SMZ concept, although helpful, is really too limited in the way most of us practice it to accomplish these things. Most of us connect SMZs to Alabama's Best Management Practices for Forestry (BMP) as a means to protect the forester, logger, and landowner from federal water quality violations. In fact, in our state BMP manual an SMZ is defined as "a strip of land immediately adjacent to a water of the state where soils, organic matter, and vegetation are managed to protect the physical, chemical, and biological integrity of surface water adjacent to and downstream from forestry operations." Thus the SMZ by definition exists to protect water quality; any other uses are afterthoughts. In practice, when we talk about SMZs we are usually focused on the minimum width needed for a streamside zone to be used as a buffer for erosion or other forms of water quality degradation.

A riparian forest, on the other hand, has a much broader definition. From a paper, *Riparian Area Management: Themes and Recommendations*, the authors define a riparian area as "a three-dimensional ecotone of interaction that includes the terrestrial and aquatic ecosystems, that extend down into the groundwater, up above the canopy, upward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the water course at a variable width." As this definition is a little too involved for most of us, I prefer the definition given in *The Riparian Forest Handbook* which simplifies it a bit and calls them simply, "streamside forests."

The point here is that while the SMZ is important for managing water quality, it is only a part of the whole streamside forest management philosophy embodied in the riparian forest concept. Riparian forests do so much more. Consider this statement from *The Riparian Forest Handbook*: "by controlling water temperature, light, habitat diversity, channel morphology, food webs and the species diversity of stream systems, riparian forests sustain the stream environment." This has major stewardship and forest sustainability implications.

Biodiversity in Alabama

Alabama is not only endowed with a wonderfully diverse and productive forest resource — almost 23 million acres of forest land — but also with a tremendous water resource as well. We have over 47,000 linear miles of perennial streams and rivers in Alabama, seventh in the nation. This combination has given us a wealth of biodiversity. In fact, Alabama ranks fourth in the nation in total number of species of plants and animals, even though we rank only 29th in size. In total number of plant and animal species per acre, we are second only to Florida. It is estimated that there are 3,800 species of plants and animals in our state. Unfortunately we also have the distinction of having the third highest number of threatened and endangered species, behind Hawaii and California, with 122 plants and animals federally listed as threatened or endangered. Some estimate that nearly 100 Alabama species have already become extinct since colonial times.

How does this relate to riparian forests? A quick survey of the 122 threatened and endangered species listed for Alabama will show that most of them live in the aquatic and streamside terrestrial portions of riparian ecosystems. Thus it follows that by managing our streamside forests as forest ecosystems, and not merely as buffers or filter strips to protect water quality, we can help sustain and perhaps even restore our immense biological heritage. This may be one of the most important stewardship actions we can take to ensure that our grandchildren are able to live in as biodiverse a world as we have been privileged to inhabit.

Benefits from Riparian Forests

A healthy riparian forest provides many tangible benefits. Like an SMZ it also acts as a filter strip to keep sediment, nutrients, and other pollutants out of the waterways. It does this by intercepting surface runoff and even ground water before it reaches a stream, causing it to deposit its sediments, nutrients, and other pollutants so they can be absorbed by the soil or broken down through the action of plants and microbes. Many plants can absorb harmful chemicals; ferns for example, have been shown to take up arsenic. A healthy and diverse riparian forest floor protects water quality. The size of an adequate filter strip will vary with soil type, slope, and vegetative diversity, but the 35-foot strip called for in Alabama's Best Management Practices for Forestry will usually suffice for this purpose.

A healthy riparian forest provides stream bank stabilization. This is important in controlling what happens to the stream channel itself and in protecting the associated aquatic ecosystem from becoming degraded. Bank erosion, when severe enough, can cause changes in channel velocity and increase sedimentation, disrupting the life cycles of aquatic plants and animals. The riparian forest also provides shade to protect aquatic ecosystems from severe temperature fluctuations that can cause serious problems for these systems, especially in nutrient recycling. It also provides the organic matter that fuels the biological process to power these systems, as well as adds structure to the habitat of both aquatic and terrestrial species.

But it is in protecting and creating diverse wildlife habitats that gives the riparian forest concept the edge over SMZs. A 35-foot SMZ filter strip is hardly adequate to promote very much habitat diversity. This is true even when horizontal and vertical structure is incorporated into the SMZ, which is not a part of the guidelines as outlined in the BMP manual. SMZs may, however, be adequate to provide the habitat needs for certain small amphibians or insects and can provide needed shade for maintaining temperature control in the adjacent aquatic ecosystems. But for anything more than this, wider and more diverse riparian forests are needed. Many riparian forest guidelines call for minimum widths of 50 feet, but advocate widths up to 150+ feet for maximum habitat diversity.

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Mussels, Alabama's Endangered Species

By ***Bob Keefe***, Retired Forester, Cullman

Of the 122 endangered species listed for Alabama, most are aquatic species and most of these are freshwater mussels. To most of us, freshwater mussels are not the attention grabbers that the more flashy endangered species are, such as the red cockaded woodpecker. In fact, mussels are so innocuous that probably few Alabamians have even seen them or know much about them. North Alabamians may know that they were an important part of the diet of Native Americans and that there is a small pearl industry in the Tennessee River based on freshwater mussels, but few realize that they have a very unique life cycle.

Mussels are common in Alabama and exist in perennial streams over most of the state. They live on stream bottoms, and for the greatest part of their lives are fairly immobile. Because of this they are very sensitive to stream pollution, especially sediment. In fact, the presence of mussels can be a good indicator of the health of a stream. Currently over 20 species of mussels all over the state are listed as endangered, an indicator of present and future water quality problems.

Although mussels seem drab in comparison to most aquatic animals, their reproductive life cycle is actually pretty unique. They have a very unusual way to keep from overpopulating their beds and dispersing their offspring. The female mussel broods its young in their gill chambers. The mussel larvae, called *glochidia*, are then released into the water where they must attach themselves to the gills of fish. Here they live as parasites for 14 to 28 days until they develop into a juvenile mussel, often in a location distant from the parent mussel.

The female mussels have developed a series of strategies to visually attract or lure fish within range. In this manner they are enabled to expel the parasitic larvae directly into the fish's mouth where they attach themselves to the gills as they pass through. Some females have developed extravagant lures that resemble small fish or aquatic insects. Some of these lures are displayed at the mouth of the female's shell, while others are attached to a gelatinous string and can be "fished" several meters downstream from the mussel.

Sediment can disrupt this cycle in several ways: 1) by removing fish which deprives the *glochidia* of a host, 2) by limiting visibility and thus the female's ability to attract a host fish, and 3) by smothering the juvenile mussels during their early development, and possibly the adult colony if sedimentation is severe enough.

Riparian forests are one of the best ways to ensure water quality and in turn help develop thriving and healthy mussel populations by protecting these delicate environments.

The Riparian Forest

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Riparian Areas Attract Wildlife Diversity

For example, it was found in a study in Texas that in well-structured, wide riparian forest zones — at least 150 feet wide — birds normally found in mature or late successional forests were abundant. Another Texas study found that squirrels were most abundant in well-structured, wide, riparian forest zones; and a Mississippi study showed the same to be true for wild turkeys. Thus these streamside forests become areas of residence for many species and travel corridors for many others.

Riparian forests are valuable as aesthetic buffers to break up harvesting units. They add diversity to the landscape — the "big picture" — which helps harvesting units to be better accepted by the public. Recent polls in Alabama show that the public does not like the way our forestry operations look, especially clearcuts, and that they often consider us to be unprofessional and uncaring based on what they see. Well-structured riparian forests can help moderate those views.

Timber production should not be neglected as a benefit from the riparian forest. These high-quality bottomland sites can produce a very valuable timber resource along with the other benefits mentioned above. In fact, the larger riparian areas can be better managed as a unit unlike the SMZ filter strips. Some form of uneven-aged management system would probably work best in riparian areas to protect their diversity and structure. Proper implementation of uneven-aged management systems is a challenge for the landowner, forester, and logger, but one that can be very rewarding.

Managing healthy and diverse riparian forests along Alabama streams is one of the most important things that landowners and foresters can do to sustain our state's tremendous natural biodiversity for future generations. It is a commitment to stewardship that wills an enduring legacy, appreciated by many generations of Alabamians to come.

For more information on riparian forests, visit the Virginia Dept. of Forestry's website at **http://state.vipnet.org/dof/.** Their publication, *The Riparian Forest Handbook - Appreciating and Evaluating Streamside Forests*, is a good place to start. They may also be reached by telephone at (434) 977-6555.

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Alabama Forestry Camp

Applications are currently being taken for Alabama Forestry Camp 2002. This five-day summer camp will be held Sunday through Thursday, June 2-6, at the Federation of Southern Cooperatives facility near Epes in Sumter County.

The camp is for high school students interested in conservation and natural resources. It is designed to teach basic forestry concepts through classroom instruction and outdoor activities.

It is open to any student, boy or girl, who is at least 15 years old and has completed the 9th grade but not yet finished the 12th grade. There is no cost to the student to attend camp.

For more information about Alabama Forestry Camp, contact Michelle Cole at the Alabama Forestry Commission, (334) 242-5585.